*This article is about general aspects of water. For a detailed discussion of its chemical properties, see*[*Properties of water*](http://en.wikipedia.org/wiki/Properties_of_water)*. For other uses, see*[*Water (disambiguation)*](http://en.wikipedia.org/wiki/Water_(disambiguation))*.*

[http://bits.wikimedia.org/static-1.20wmf12/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Iceberg_with_hole_near_sanderson_hope_2007-07-28_2.jpg)

Water in three states: liquid, solid ([ice](http://en.wikipedia.org/wiki/Ice)), and (invisible)[water vapor](http://en.wikipedia.org/wiki/Water_vapor" \o "Water vapor) in the air. [Clouds](http://en.wikipedia.org/wiki/Clouds) are accumulations of water droplets, [condensed](http://en.wikipedia.org/wiki/Condensation) from vapor-saturated air.

**Water** is a [chemical substance](http://en.wikipedia.org/wiki/Chemical_substance) with the [chemical formula](http://en.wikipedia.org/wiki/Chemical_formula) [H](http://en.wikipedia.org/wiki/Hydrogen)2[O](http://en.wikipedia.org/wiki/Oxygen). A water [molecule](http://en.wikipedia.org/wiki/Molecule) contains one [oxygen](http://en.wikipedia.org/wiki/Oxygen) and two [hydrogen](http://en.wikipedia.org/wiki/Hydrogen) [atoms](http://en.wikipedia.org/wiki/Atoms" \o "Atoms)connected by [covalent](http://en.wikipedia.org/wiki/Covalent) bonds. Water is a [liquid](http://en.wikipedia.org/wiki/Liquid) at temperatures above 0 °C (273.15 K, 32 °F) at sea level, but it often co-exists on [Earth](http://en.wikipedia.org/wiki/Earth" \o "Earth)with its [solid](http://en.wikipedia.org/wiki/Solid) state, [ice](http://en.wikipedia.org/wiki/Ice), and [gaseous](http://en.wikipedia.org/wiki/Gaseous) state ([water vapor](http://en.wikipedia.org/wiki/Water_vapor) or [steam](http://en.wikipedia.org/wiki/Steam)). Water also exists in a [liquid crystal](http://en.wikipedia.org/wiki/Liquid_crystal) state near [hydrophilic](http://en.wikipedia.org/wiki/Hydrophile" \o "Hydrophile)surfaces.[[1]](http://en.wikipedia.org/wiki/Water#cite_note-0)[[2]](http://en.wikipedia.org/wiki/Water#cite_note-1)

Water covers 71% of the [Earth](http://en.wikipedia.org/wiki/Earth)'s surface,[[3]](http://en.wikipedia.org/wiki/Water" \l "cite_note-2) and is vital for all known forms of [life](http://en.wikipedia.org/wiki/Life#Range_of_tolerance).[[4]](http://en.wikipedia.org/wiki/Water#cite_note-3) On Earth, 96.5% of the planet's water is found in oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps of Antarctica and Greenland, a small fraction in other large water bodies, and 0.001% in the [air](http://en.wikipedia.org/wiki/Atmosphere) as [vapor](http://en.wikipedia.org/wiki/Vapor), [clouds](http://en.wikipedia.org/wiki/Cloud) (formed of solid and liquid water particles suspended in air), and [precipitation](http://en.wikipedia.org/wiki/Precipitation_(meteorology)).[[5]](http://en.wikipedia.org/wiki/Water#cite_note-b1-4)[[6]](http://en.wikipedia.org/wiki/Water#cite_note-5) Only 2.5% of the Earth's water is freshwater, and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products.[[5]](http://en.wikipedia.org/wiki/Water#cite_note-b1-4)

Water on Earth moves continually through the [hydrological cycle](http://en.wikipedia.org/wiki/Hydrological_cycle) of [evaporation](http://en.wikipedia.org/wiki/Evaporation) and [transpiration](http://en.wikipedia.org/wiki/Transpiration) ([evapotranspiration](http://en.wikipedia.org/wiki/Evapotranspiration)), [condensation](http://en.wikipedia.org/wiki/Condensation),[precipitation](http://en.wikipedia.org/wiki/Precipitation_(meteorology)), and [runoff](http://en.wikipedia.org/wiki/Runoff_(water)), usually reaching the [sea](http://en.wikipedia.org/wiki/Sea). Evaporation and transpiration contribute to the precipitation over land.

Safe [drinking water](http://en.wikipedia.org/wiki/Drinking_water) is essential to [humans](http://en.wikipedia.org/wiki/Humans) and other lifeforms. Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to safe water and over 2.5 billion lack access to adequate sanitation.[[7]](http://en.wikipedia.org/wiki/Water#cite_note-UN-6) There is a clear correlation between access to safe water and [GDP](http://en.wikipedia.org/wiki/Gross_domestic_product) per capita.[[8]](http://en.wikipedia.org/wiki/Water#cite_note-7) However, some observers have estimated that by 2025 more than half of the [world population](http://en.wikipedia.org/wiki/World_population) will be facing water-based vulnerability.[[9]](http://en.wikipedia.org/wiki/Water#cite_note-8) A recent report (November 2009) suggests that by 2030, in some developing regions of the world, water demand will exceed supply by 50%.[[10]](http://en.wikipedia.org/wiki/Water#cite_note-9) Water plays an important role in the [world economy](http://en.wikipedia.org/wiki/World_economy), as it functions as a [solvent](http://en.wikipedia.org/wiki/Solvent) for a wide variety of chemical substances and facilitates industrial cooling and transportation. Approximately 70% of the [fresh water](http://en.wikipedia.org/wiki/Fresh_water) used by humans goes to [agriculture](http://en.wikipedia.org/wiki/Agriculture).[[1](http://en.wikipedia.org/wiki/Water#cite_note-Baroni2007-10)

Chemical and physical properties

*Main articles:*[*Properties of water*](http://en.wikipedia.org/wiki/Properties_of_water)*,*[*Water (data page)*](http://en.wikipedia.org/wiki/Water_(data_page))*, and*[*Water model*](http://en.wikipedia.org/wiki/Water_model)

[http://bits.wikimedia.org/static-1.20wmf12/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:3D_model_hydrogen_bonds_in_water.svg)

Model of [hydrogen bonds](http://en.wikipedia.org/wiki/Hydrogen_bond) (1) between molecules of water

[http://bits.wikimedia.org/static-1.20wmf12/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Water_droplet_blue_bg05.jpg)

Impact from a water drop causes an upward "rebound" jet surrounded by circular[capillary waves](http://en.wikipedia.org/wiki/Capillary_wave).

[http://bits.wikimedia.org/static-1.20wmf12/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:SnowflakesWilsonBentley.jpg)

[*Snowflakes*](http://en.wikipedia.org/wiki/Snowflake) by [Wilson Bentley](http://en.wikipedia.org/wiki/Wilson_Bentley), 1902

[http://bits.wikimedia.org/static-1.20wmf12/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Spider_web_Luc_Viatour.jpg)

[Dew](http://en.wikipedia.org/wiki/Dew) drops adhering to a [spider web](http://en.wikipedia.org/wiki/Spider_web)

[http://bits.wikimedia.org/static-1.20wmf12/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Capillarity.svg)

[Capillary action](http://en.wikipedia.org/wiki/Capillary_action) of water compared to [mercury](http://en.wikipedia.org/wiki/Mercury_(element))

Water is the [chemical substance](http://en.wikipedia.org/wiki/Chemical_substance) with [chemical formula](http://en.wikipedia.org/wiki/Chemical_formula) H2O: one [molecule](http://en.wikipedia.org/wiki/Molecule) of water has two [hydrogen](http://en.wikipedia.org/wiki/Hydrogen) [atoms](http://en.wikipedia.org/wiki/Atom" \o "Atom)[covalently](http://en.wikipedia.org/wiki/Covalent) [bonded](http://en.wikipedia.org/wiki/Chemical_bond) to a single [oxygen](http://en.wikipedia.org/wiki/Oxygen) atom.

Water appears in nature in all three common states of matter (solid, liquid, and gas) and may take many different forms on Earth: water vapor and clouds in the sky; [seawater](http://en.wikipedia.org/wiki/Seawater) in the oceans; [icebergs](http://en.wikipedia.org/wiki/Iceberg) in the polar oceans; [glaciers](http://en.wikipedia.org/wiki/Glacier) and [rivers](http://en.wikipedia.org/wiki/River) in the [mountains](http://en.wikipedia.org/wiki/Mountain); and the liquid in aquifers in the ground.

At high temperatures and pressures, such as in the interior of very large planets, it is argued that water exists as [ionic water](http://en.wikipedia.org/w/index.php?title=Ionic_water&action=edit&redlink=1) in which the molecules break down into a soup of hydrogen and oxygen ions, and at even higher pressures as [superionic water](http://en.wikipedia.org/wiki/Superionic_water" \o "Superionic water) in which the oxygen crystallises but the hydrogen ions float around freely within the oxygen lattice.[[12]](http://en.wikipedia.org/wiki/Water#cite_note-newscientist.com-11)

The major chemical and physical properties of water are:

* Water is a liquid at [standard temperature and pressure](http://en.wikipedia.org/wiki/Standard_conditions). It is tasteless and odorless. The intrinsic [colour of water](http://en.wikipedia.org/wiki/Colour_of_water" \o "Colour of water) and ice is a very slight blue hue, although both appear colorless in small quantities. Water vapour is essentially invisible as a gas.[[13]](http://en.wikipedia.org/wiki/Water#cite_note-12)
* Water is [transparent](http://en.wikipedia.org/wiki/Transparency_(optics)) in the visible [electromagnetic spectrum](http://en.wikipedia.org/wiki/Electromagnetic_spectrum). Thus [aquatic plants](http://en.wikipedia.org/wiki/Aquatic_plant) can live in water because[sunlight](http://en.wikipedia.org/wiki/Sunlight) can reach them. Infrared light is strongly [absorbed](http://en.wikipedia.org/wiki/Absorption_(electromagnetic_radiation)) by the hydrogen-oxygen or OH bonds.
* Since the water molecule is not linear and the oxygen atom has a higher [electronegativity](http://en.wikipedia.org/wiki/Electronegativity) than hydrogen atoms, it carries a slight negative charge, whereas the hydrogen atoms are slightly positive. As a result, water is a [polar molecule](http://en.wikipedia.org/wiki/Polar_molecule) with an [electrical dipole moment](http://en.wikipedia.org/wiki/Electrical_dipole_moment). Water also can form an unusually large number of intermolecular [hydrogen bonds](http://en.wikipedia.org/wiki/Hydrogen_bonds) (four) for a molecule of its size. These factors lead to strong attractive forces between molecules of water, giving rise to water's high [surface tension](http://en.wikipedia.org/wiki/Surface_tension)[[14]](http://en.wikipedia.org/wiki/Water#cite_note-13) and capillary forces. The [capillary action](http://en.wikipedia.org/wiki/Capillary_action) refers to the tendency of water to move up a narrow tube against the force of [gravity](http://en.wikipedia.org/wiki/Gravity). This property is relied upon by all [vascular plants](http://en.wikipedia.org/wiki/Vascular_plant), such as trees.[[15]](http://en.wikipedia.org/wiki/Water#cite_note-14)
* Water is a good polar [solvent](http://en.wikipedia.org/wiki/Solvent) and is often referred to as *the universal*[*solvent*](http://en.wikipedia.org/wiki/Solvent). Substances that dissolve in water, e.g., [salts](http://en.wikipedia.org/wiki/Salt_(chemistry)), [sugars](http://en.wikipedia.org/wiki/Sugar), [acids](http://en.wikipedia.org/wiki/Acid), [alkalis](http://en.wikipedia.org/wiki/Alkali), and some [gases](http://en.wikipedia.org/wiki/Gas) – especially oxygen, [carbon dioxide](http://en.wikipedia.org/wiki/Carbon_dioxide) ([carbonation](http://en.wikipedia.org/wiki/Carbonation)) are known as [*hydrophilic*](http://en.wikipedia.org/wiki/Hydrophilic) (water-loving) substances, while those that are[immiscible](http://en.wikipedia.org/wiki/Miscibility) with water (e.g., [fats and oils](http://en.wikipedia.org/wiki/Lipids)), are known as [*hydrophobic*](http://en.wikipedia.org/wiki/Hydrophobic) (water-fearing) substances.
* Most of the major components in cells ([proteins](http://en.wikipedia.org/wiki/Protein), [DNA](http://en.wikipedia.org/wiki/DNA) and [polysaccharides](http://en.wikipedia.org/wiki/Polysaccharide)) are also dissolved in water.
* Pure water has a low [electrical conductivity](http://en.wikipedia.org/wiki/Electrical_conductivity), but this increases with the [dissolution](http://en.wikipedia.org/wiki/Dissolution_(chemistry)) of a small amount of ionic material such as [sodium chloride](http://en.wikipedia.org/wiki/Sodium_chloride).
* The [boiling point](http://en.wikipedia.org/wiki/Boiling_point) of water (and all other liquids) is dependent on the [barometric pressure](http://en.wikipedia.org/wiki/Barometric_pressure). For example, on the top of [Mt. Everest](http://en.wikipedia.org/wiki/Mt._Everest) water boils at 68 °C(154 °F), compared to 100 °C (212 °F) at [sea level](http://en.wikipedia.org/wiki/Sea_level). Conversely, water deep in the ocean near geothermal vents can reach temperatures of hundreds of degrees and remain liquid.
* At 4181.3 J/(kg·K), water has a high [specific heat capacity](http://en.wikipedia.org/wiki/Specific_heat_capacity), as well as a high [heat of vaporization](http://en.wikipedia.org/wiki/Heat_of_vaporization) (40.65 kJ·mol−1), both of which are a result of the extensive [hydrogen bonding](http://en.wikipedia.org/wiki/Hydrogen_bonding) between its molecules. These two unusual properties allow water to moderate Earth's [climate](http://en.wikipedia.org/wiki/Climate) by buffering large fluctuations in temperature.
* The maximum [density](http://en.wikipedia.org/wiki/Density) of water occurs at 3.98 °C (39.16 °F).[[16]](http://en.wikipedia.org/wiki/Water#cite_note-15) It has the anomalous property of becoming less dense, not more, when it is cooled to its solid form, ice. It expands to occupy 9% greater volume in this solid state, which accounts for the fact of ice floating on liquid water, as in[icebergs](http://en.wikipedia.org/wiki/Icebergs).
* Its [density](http://en.wikipedia.org/wiki/Density) is 1,000 kg/m3 (62.428 lb/cu ft or 8.3454 lb/US gal) liquid (at 4 °C; ice has a density of 917 kg/m3).[[17]](http://en.wikipedia.org/wiki/Water#cite_note-16)

[http://bits.wikimedia.org/static-1.20wmf12/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Label_for_dangerous_goods_-_class_4.3.svg)

[ADR](http://en.wikipedia.org/wiki/European_Agreement_concerning_the_International_Carriage_of_Dangerous_Goods_by_Road) [label](http://en.wikipedia.org/wiki/Dangerous_goods) for transporting goods dangerously reactive with water

* Water is [miscible](http://en.wikipedia.org/wiki/Miscible) with many liquids, such as [ethanol](http://en.wikipedia.org/wiki/Ethanol), in all proportions, forming a single [homogeneous](http://en.wikipedia.org/wiki/Homogeneous_(chemistry)) liquid. On the other hand, water and most[oils](http://en.wikipedia.org/wiki/Oil) are immiscible, usually forming layers according to increasing density from the top. As a gas, water vapor is completely [miscible](http://en.wikipedia.org/wiki/Miscible) with air.
* Water forms an [azeotrope](http://en.wikipedia.org/wiki/Azeotrope" \o "Azeotrope) with many other solvents.
* Water can be [split by electrolysis](http://en.wikipedia.org/wiki/Electrolysis_of_water) into hydrogen and oxygen.
* As an oxide of hydrogen, water is formed when hydrogen or hydrogen-containing compounds [burn](http://en.wikipedia.org/wiki/Combustion) or [react](http://en.wikipedia.org/wiki/Chemical_reaction) with oxygen or oxygen-containing compounds. Water is not a [fuel](http://en.wikipedia.org/wiki/Fuel), it is an end-product of the combustion of hydrogen. The [energy](http://en.wikipedia.org/wiki/Energy) required to split water into hydrogen and oxygen by[electrolysis](http://en.wikipedia.org/wiki/Electrolysis) or any other means is greater than the energy that can be collected when the hydrogen and oxygen recombine.[[18]](http://en.wikipedia.org/wiki/Water#cite_note-17)
* [Elements](http://en.wikipedia.org/wiki/Chemical_element) which are more [electropositive](http://en.wikipedia.org/wiki/Electropositivity) than hydrogen such as [lithium](http://en.wikipedia.org/wiki/Lithium), [sodium](http://en.wikipedia.org/wiki/Sodium), [calcium](http://en.wikipedia.org/wiki/Calcium), [potassium](http://en.wikipedia.org/wiki/Potassium) and [caesium](http://en.wikipedia.org/wiki/Caesium" \o "Caesium) displace hydrogen from water, forming[hydroxides](http://en.wikipedia.org/wiki/Hydroxide). Being a flammable gas, the hydrogen given off is dangerous and the reaction of water with the more electropositive of these elements may be violently explosive.

